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Desalination of sandstone with two different setups under an applied electric field

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Soluble salts are considered as one of the main degradation agents which can affect the architectural heritage [1, 2]. There are currently many different techniques that try to decrease the salt concentration to the levels meeting safety limits. At the present time, the technique called electrokinetics is the most highlighted. The efficiency and the suitability of this technique have been demonstrated in several studies both in the laboratory [3-5] and in the pilot scale test [6]. The present study aims to compare the removal efficiency of chlorides from a sandstone when two different electrokinetic setups are used.

The laboratory experiment was conducted with a big block of sandstone of 0.02 m^3 which was contaminated with unknown amount of chlorides. The main goal of this investigation was to analyse the removal efficiency of chlorides in the areas where the electrode units were placed. In the first electrokinetic setup, 6 plastic cylinders (electrode units) of 0.03 m^2 filled with the clay poultices were placed oppositely at different heights of the sandstone block (upper, middle and bottom placement). The placement of the cylinders covered about 5.6 % of the total rock surface. The second electrokinetic setup consisted of two casings (electrode units) filled with clay poultices were placed oppositely as well. The covering with casings was about 9.3 % of the total rock surface. The results obtained from these two different setups were compared.

It was shown that the bigger surface area covered with the electrode units, the bigger influence on desalination efficiency it had. Therefore it was found out that the second electrokinetic setup showed higher removal efficiency for chlorides from the sandstone. It was also shown that the distance between the electrode units was a limiting factor of this technique.

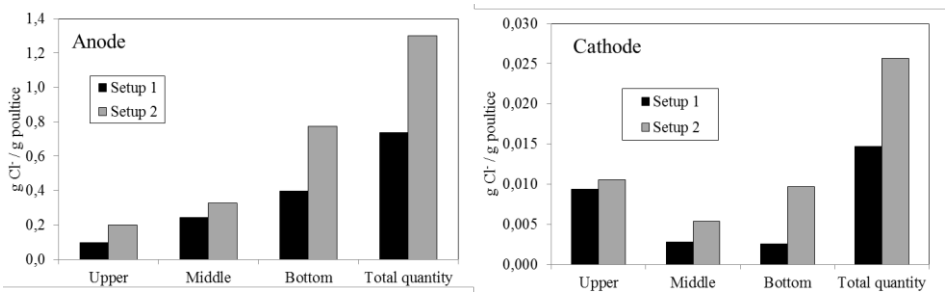

Figure 1.: average mass of chloride (2 test per setup) extracted by the poultices applied close to the electrodes at different heights

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